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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,610	03/23/2004	Toshimitsu Taniguchi	10417-039002 / F51-125462	2451

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EXAMINER	
GEBREMARIAM, SAMUEL A	
ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 11/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/806,610	TANIGUCHI ET AL.	
	Examiner	Art Unit	
	Samuel A. Gebremariam	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,5,22 and 23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,5,22 and 23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: In line 8, claim 1, refers to a drain layer. It appears applicant is referring to the high concentration drain layer. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Kawaguchi et al., US patent No. 6,259,136.

Regarding claim 1, Kawaguchi teaches (fig. 3) a semiconductor device comprising: high concentration source (13) and drain (16) layers of a reverse conductive type (conductivity type of the source/drain region is different than the substrate) formed in a semiconductor layer (11) of one conductive type (p), a gate electrode (19) formed on a channel layer located between the source and drain layers (channel region inherently exists between source and drain layers), a body layer (12) of one conductive type in direct contact with the high concentration source layer (13) and a low concentration drain layer (14) of the reverse conductive type (conductivity type of the

low concentration drain region is different than the body region) formed between the channel layer (region between the 13 and 16) and the drain layer(portion of 14 that is between the channel layer and 16), wherein: the body layer (12) is formed only under the gate electrode (19).

Regarding claim 2, Kawaguchi teaches the entire claimed structure of claim 1 above including the gate electrode (19) is formed on channel layer via a gate oxide film (17); wherein the high concentration source layer (13) is adjacent to one end of the gate electrode (19, refer to fig. 3); wherein the high concentration drain layer (16) is formed apart from an other end of the gate electrode (19, refer to fig. 3); wherein the low concentration drain layer (14) extends from under the gate electrode (19) and surrounds the high concentration drain layer (16); and wherein the body layer(12) is formed between the high concentration source layer (13) and the high concentration drain layer (16, portion of 12 is formed between 13 and 16).

Regarding claim 4, Kawaguchi teaches the entire claimed structure of claim 1 above including the low concentration drain layer (14, layer 14 has portion that are shallow under the gate and deep under 16, fig. 3) is shallow under the gate electrode (19) and deep under the high concentration drain layer (16).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawaguchi in view of Soderbarg et al., US patent No. 5,844,272.

Kawaguchi teaches substantially the entire claimed structure of claim 1 above except explicitly stating a reverse conductive type layer is formed in a surface portion of the body layer.

Soderbarg teaches forming a (n-) region on the side surface of a p-body region (22) in a structure of high voltage device.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the reverse conductive type layer formed in the side surface portion of the body layer as taught by Soderbarg in the structure of Kawaguchi in order to form an n-channel transistor.

6. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hong, US patent No. 5,576,574 in view of Chen et al., US patent No. 5,926,712.

Regarding claim 22, Hong teaches a semiconductor device (fig. 2f) comprising: high concentration source (270a) and drain (270b) layers of a reverse conductive type (conductivity type of the source/drain region is different than the substrate) formed in a semiconductor layer (2) of one conductive type; a gate electrode (26) on a channel layer located between the high concentration source (270a) and drain (270b) layers and formed via a gate oxide film (220); a body layer (250) of one conductive type formed only under the gate electrode (26) and formed apart from the high concentration source and drain layers (fig. 2f); and low concentration source (210a) and drain (210b) layers of the reverse conductive type respectively; wherein the low concentration source and

drain layers are separated from each other by the body layer (refer to fig. 2f); and wherein the body layer (250) is in direct contact with the low concentration source (210a) and drain (210b) layers.

Hong does not teach that the low concentration source and drain layers surrounding the high concentration source layer and the high concentration drain layer.

Chen teaches (fig. 2c and 2f) forming low concentration source/drain layers (216) of the reverse conductive type formed so that they respectively surround the source /drain layers (219) of the reverse conductive type.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the low concentration layer of reverse conductive type to surround the source/drain layers of the reverse conductive type of Hong's structure as suggested by Chen in order to form a MOS device that is immune from threshold voltage drop.

Regarding claim 23, Hong teaches substantially the entire claimed structure of claim 22 above including the low concentration source/drain layers of the reverse conductive type are formed so that they are shallow under the gate electrode (Chen 215) and are deep under the high concentration source/drain layers of the reverse conductive type (refer to fig. 2f of Chen).

Response to Arguments

7. Applicant's arguments with respect to claims 1-2 and 4-5 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG
November 21, 2005

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SUPERVISORY PATENT EXAMINER
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